

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
22 November 2001 (22.11.2001)

PCT

(10) International Publication Number  
**WO 01/87187 A1**

(51) International Patent Classification<sup>7</sup>: **A61F 2/16**

Arnold [GB/GB]; The Manor House, Church Road, Mep-  
pershall, Bedfordshire SG17 5NA (GB).

(21) International Application Number: PCT/GB01/02101

(22) International Filing Date: 14 May 2001 (14.05.2001)

(74) Agent: **THOMSON, Roger, Bruce**; W P Thompson &  
Co, Eastcheap House, Central Approach, Letchworth,  
Hertfordshire SG6 3SD (GB).

(25) Filing Language: English

(26) Publication Language: English

(81) Designated States (*national*): AU, BR, CA, GB, JP, RU,  
US.

(30) Priority Data:  
0011507.1 13 May 2000 (13.05.2000) GB

(84) Designated States (*regional*): European patent (AT, BE,  
CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,  
NL, PT, SE, TR).

(71) Applicant (*for all designated States except US*): **DUCK-  
WORTH & KENT LIMITED** [GB/GB]; Terence House,  
7 Marquis Business Centre, Royston Road, Baldock, Hert-  
fordshire SG7 6XL (GB).

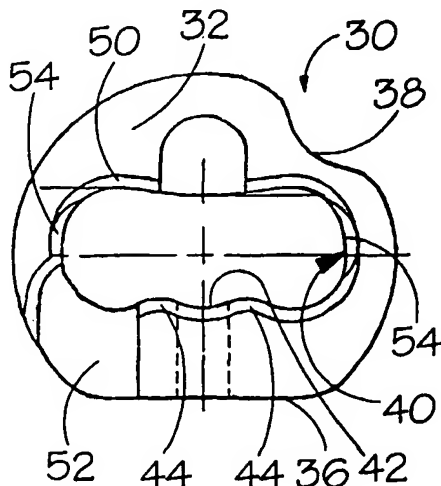
Published:  
— with international search report

*For two-letter codes and other abbreviations, refer to the "Guid-  
ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.*

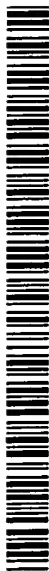
(72) Inventor; and

(75) Inventor/Applicant (*for US only*): **WALDOCK, Terence,**

(54) Title: **OPHTHALMIC LENS INJECTORS**



(57) Abstract: An instrument for the insertion of an intraocular lens into an eye comprises a body portion, e.g. a barrel, a nose portion having a lumen through which the lens passes, and a push rod connected to a plunger. Within the nose portion is an insert (30) which defines a passageway (40) therethrough. The passageway has a configuration which includes a smoothly continuous undulating surface (42, 44) upon which a lens rests. A cutout (52) accommodates the trailing haptic. For acrylic lenses, the undulating surface is preferably provided by a recess in the bottom of the passageway, the recess reducing in width and depth to define an upwardly sloping surface on which the lens is deposited.



WO 01/87187 A1

OPHTHALMIC LENS INJECTORSField of the invention

This invention relates to improvements in ophthalmic lens injectors, and is particularly concerned with lens injectors 5 of the type described in our application WO99/33411.

The lens injectors described in WO99/33411 comprise a body portion, a nose portion through which runs a passage or lumen for the lens to pass to a dispensing tip, and a plunger. The nose portion is pivotally connected to the body portion 10 so that the barrel can be broken open for the placement of the lens into the nose portion. In the aforesaid publication the lens is preferably placed on two spaced parallel nose pins to facilitate its folding. In some of the described embodiments in the aforesaid publication there is provided also a cross 15 pin which straddles the nose pins and under which the intraocular lens is arranged to pass. The purpose of this cross pin is to prevent lifting and tilting of the lens, so that when the plunger pushes it forwards it travels smoothly forwards and is folded properly.

20 Summary of the invention

It is an object of the present invention to provide improved designs of nose assembly for ophthalmic injectors for injecting intraocular lenses. In the present invention the pins described above are replaced by a specially shaped member 25 within the nose assembly. This member is specially shaped so that it provides an internal surface configuration to assist in guiding the lens into the lumen through which the lens has to pass.

Intraocular lenses may be of silicone or acrylic 30 material. The nose member of the present invention is appropriate for use with both types of lens, although the

internal surface configuration may differ, depending on the characteristics of the lens to be inserted. Silicone lenses have haptics which are relatively thin and which are fixed to the lens body. Acrylic lenses have the lens body and haptics 5 made in one piece, with thicker haptics. Also, acrylic material marks more easily than silicone.

In accordance with the present invention there is provided an instrument for the insertion of an intraocular lens into an eye, which comprises a body portion, a nose 10 portion forwardly of the body portion and having a lumen through which the lens is arranged to pass, and push rod means moveable through the body portion and the nose portion to push an inserted lens forwards, wherein there is provided in the nose portion means defining a passageway therethrough, the 15 passageway having a configuration which includes a smoothly continuous undulating surface upon which a lens to be inserted is arranged to rest.

Preferably, the means defining the passageway is an insert having an external configuration which makes it non- 20 rotatable within the nose assembly. In a preferred embodiment the insert has a forwardly projecting portion shaped to match the internal configuration of the lumen through the nose assembly and providing guide means for the forward guidance of the lens.

25 In one embodiment, particularly suitable for silicone lenses, the undulating surface comprises two upstanding arcuate ribs at the bottom of the passageway. Preferably, in order to ensure that the trailing haptic remains free, there is provided a cutout to accommodate the trailing haptic at one 30 side of the bottom of the passageway.

In another embodiment, particularly suitable for acrylic

lenses, the undulating surface is provided by a recess in the bottom of the passageway. This enables a lower entry of the lens into the chamber defined by the passageway and keeps the lens away from the upper surface of the passageway.

#### 5 Brief description of the drawings

In order that the invention may be more fully understood, a number of presently preferred embodiments of lens injector in accordance with the invention will now be described in more detail by way of example and with reference to the  
10 accompanying drawings, in which:

Fig. 1 is a side view of a lens injector in accordance with the invention incorporating a nose assembly of the present invention;

Fig. 2 is a top plan view of the lens injector of Fig.  
15 1, with the plunger retracted;

Fig. 3 is a view from the other side of the lens injector of Fig. 1, with the plunger retracted;

Fig. 4 is a side view of the nose of the lens injector;

Fig. 5 is an end view of the nose of Fig. 4, viewed from  
20 the right-hand end of Fig. 4;

Fig. 6 is a view from the other side of the nose of Fig.  
4;

Fig. 7 is a top plan view of the nose of Fig. 4;

Fig. 8 is an end view of the nose as shown in Fig. 7,  
25 viewed from the right-hand end of Fig. 7;

Fig. 9 is a side view of a first embodiment of nose insert for insertion into the nose of Figs. 4 to 8;

Fig. 10 is an end view of the nose insert of Fig. 9,  
viewed from the right-hand end of Fig. 9;

30 Fig. 11 is a side view of a second embodiment of nose insert;

Fig. 12 is an end view of the nose insert of Fig. 11, viewed from the right-hand end of Fig. 11;

Fig. 13 is a side view of a third embodiment of nose insert;

5 Fig. 14 is an end view of the nose insert of Fig. 13, viewed from the right-hand end of Fig. 13;

Fig. 15 is a plan view of the nose insert of Figs. 13 and 14;

Fig. 16 is the side view of Fig. 13, showing the loading  
10 forceps in position;

Fig. 17 is a side view of the centre rod used with the nose insert of Figs. 9 and 10;

Fig. 18 is a side view of the centre rod used with the nose insert of Figs. 11 and 12; and,

15 Fig. 19 is a side view of the centre rod used with the nose insert of Figs. 13 to 15.

#### Description of the preferred embodiments

Referring first to Figs. 1 to 3, the intraocular lens injector shown there is of the general type described and  
20 shown in our patent application PCT/GB98/03917 (WO99/33411) which has a nose portion which can be "broken open" in like manner to a shotgun barrel. However, it is to be understood that the present invention is applicable to other types of intraocular lens injectors, and that the embodiments of nose  
25 assembly are described in relation to this particular type of lens injector by way of example only.

The lens injector as shown in the drawings essentially comprises a body portion 10, a plunger 12 and a nose indicated generally at 14. The nose 14 can be "broken open" in like  
30 manner to a shotgun barrel. In the closed position as shown in the drawings the nose 14 is coaxial with the main body 10

and the plunger 12. The body portion 10 has a finger 16 projecting from the front end of the body at the bottom of the body, and a pivot pin 18 extends through the nose and the finger to provide the pivotal mounting. The nose is pivotable 5 through 90° from the open position to the closed position and vice versa.

The nose 14 will be described in more detail hereinafter. Suffice it to say here that there is a passage completely through the nose which changes in cross-section and 10 configuration from one end of the nose to the other. At the distal end the nose has a tip 20 through which the lens is ejected. As shown in Fig. 1, when the plunger 12 is fully depressed, a centre rod 22, which is secured to the plunger, passes out through the tip of the nose. The plunger 12 is 15 slidable within the body portion 10 which is in the form of a cylindrical barrel having a bore therethrough. A spring 24 provides a force against which the plunger is depressed and which urges the plunger into its retracted position as shown in Figs. 2 and 3. For further details of the structure of the 20 lens injector, reference should be made to the aforesaid application WO99/33411.

The nose assembly 14 includes, as stated, a tip portion 20 which is shaped at its outer end to form a dispensing aperture of appropriate shape and orientation. Through the 25 nose 14 there extends an internal passageway 26 along which the lens passes under the action of the centre rod or push rod 22, embodiments of which are shown most clearly in Figs. 17 to 19.

The internal shape and configuration of the nose 14 can 30 be seen from Figs. 4 to 8. The rearward end of the nose 14 is recessed, as indicated at 28, to receive a nose insert 30

which is shown most clearly in Figs. 9 and 10, but which can also be seen, in position, in Figs. 1 and 2. The cross-sectional configuration of the recess 28 in the nose 14 matches the external configuration of the insert 30 shown in 5 Figs. 9 and 10. Thus, the insert 30 as shown in Fig. 10 will fit directly into the recess 28 as presented in Fig. 8. The inside surface of the taper and of the ongoing bore of the passageway 26 through the nose 14 must have a good machined finish with a smooth transition between the taper and the 10 subsequent bore.

The insert 30 is shown most clearly in Figs. 9 and 10. It is shaped and configured to permit the dispensing of the lens reliably and effectively through the nose without the use of pins to support and guide the lens. The nose insert shown 15 in Figs. 9 and 10 is particularly suited for the insertion of silicone lenses. The insert 30 is a one-piece element, for example of titanium, shaped to fit within the nose 14. It comprises a shoulder portion 32 and a forwardly projecting arm 34. The shoulder portion 32 has one face 36 which is flat 20 and its otherwise circular periphery is indented at 38 for engagement by a pin to prevent rotation of the insert 30 within the nose 14. The shoulder 32 has a bore 40 therethrough. This is generally rectangular in cross-section as shown most clearly in Fig. 10, but with the bottom surface 25 42 having a smoothly continuous undulating shape defining two upstanding arcuate ribs 44. The lens to be inserted is placed in this bore 40 on the ribs 44 using forceps. The forwardly projecting arm 34 of the insert 30 is provided with a guide channel 46 which forms a continuation of the guide surface 42, 30 for the onward passage of the lens through the nose and into the tip. The underside 48 of the arm 34 as shown in Fig. 9

is concavely curved to match the configuration of the tapered passageway 26 within the nose 14.

Shaping the nose insert recess 40 in this way, and extending this into a tapered bore 26 through the nose, causes the lens which is inserted to be folded as it is pushed forward by the push rod 22 into the passage through the tip. The folding of the lens is effected by the shape of the encircling passageway, namely by the undulations 44 and the taper of the passageway.

10 A second embodiment of nose insert is shown in Figs. 11 and 12. The same or corresponding features shown in Figs. 9 and 10 are indicated by the respective same reference numerals. In this embodiment, the internal shape of the passageway 40 is generally the same as in Figs. 9 and 10, 15 although the upper surface of the passageway is here slightly convex downwards. Also, the opening to the passageway 40 is here shown as chamfered at 50. The main difference in the embodiment shown in Figs. 11 and 12 is that a cutout 52 is provided in the input end face of the insert, from the 20 exterior of the insert to one bottom corner of the passageway 40, adjacent to one of the arcuate ribs 44. This cutout 52 is to accommodate the trailing haptic, so that there is a reduced danger of this becoming trapped or otherwise being caught up upon the insertion of the lens with the forceps.

25 The nose insert 30 of Figs. 11 and 12 is particularly suited for use with silicone lenses. In order to enable the nose insert of Figs. 11 and 12 to accept a 6mm silicone lens, two small recesses 54 are provided in the passageway 40, one on each lateral side of the passageway. These provide extra 30 width for the 6mm lens to be deposited in the nose insert.

Figs. 13 to 15 show a third embodiment of nose insert,



here indicated generally at 60. If one is dealing with acrylic lenses, where the lens body is integral with the haptics, the haptics are thicker than in the case of a silicone lens. Also the acrylic material marks more easily than silicone. It is therefore desirable to be able to keep the lens low on insertion into the passageway of the nose insert and in particular to keep the lens away from the upper surface of the passageway. A nose insert which enables this to be achieved is shown in Figs. 13 to 15. Here the passageway through the shoulder 32 of the nose insert is indicated at 62 and again has a chamfered surround 50. However, as compared with the second embodiment, the configuration of the bottom surface of the passageway 62 is different. It is here recessed as indicated at 64. As shown most clearly in Figs. 13 and 15, the recess 64 extends through the shoulder portion 32 and into the projecting arm 34 of the insert, becoming shallower and tapering in width. The undulating smoothly continuous bottom surface of the passageway 62 is therefore here formed by lateral shoulders 66 and the intermediate recess 64. This configuration enables the lens to be placed with the forceps low in the chamber and in a way which causes it to be folded as it is pushed forward. In this embodiment, only the forward end of the arm 34 is provided with a guide channel 68. Below the recess 64, there is provided a notch 70 in the face of the insert. This notch 70 is arranged to receive a pin 72 which projects from the underside of the forceps used to insert the lens. Fig. 16 shows the insert 60 with a pair of forceps 74 in position within the insert, positioned to deposit the lens within the chamber. Using the forceps 74 in this way, the lens is deposited on an "up" slope, namely the bottom of the recess

64 which slopes upwards from the front face of the nose insert towards the nose tip. This gives a more reliable and effective deposition of the lens, particularly with an acrylic lens.

5 Figs. 17 to 19 show three embodiments of centre rod 22 which are used respectively for the pushing of the lens forwards and out of the nose insert as shown in each of the three embodiments described above. In each case the centre rod is indicated at 22. The rear end of each centre rod is  
10 connected to the plunger 12. The shape and configuration of the front end of the push rod 22 is in each case designed to enable it to engage and hold the lens in its forward movement through the lumen. As shown, the front end is shaped to define an engaging recess 76 which "picks up" the lens when  
15 placed within the chamber in the insert. The recess 76 is preferably tropezoidal in shape in the side view as shown. As shown in Fig. 1, when the plunger is fully depressed, the push rod 22 extends fully out through the tip 20 to enable the lens to be inserted into an incision in the eye.

## CLAIMS:

1. An instrument for the insertion of an intraocular lens into an eye, which comprises a body portion, a nose portion forwardly of the body portion and having a lumen 5 through which the lens is arranged to pass, and push rod means moveable through the body portion and the nose portion to push an inserted lens forwards, wherein there is provided in the nose portion means defining a passageway therethrough, the passageway having a configuration which includes a smoothly 10 continuous undulating surface upon which a lens to be inserted is arranged to rest.

2. An instrument according to claim 1, in which the means defining the passageway is an insert having an external configuration which makes it non-rotatable with the nose 15 portion.

3. An instrument according to claim 2, in which the insert has a forwardly projecting portion shaped to match the internal configuration of the lumen through the nose portion and providing guide means for the forward guidance of the 20 lens.

4. An instrument according to any preceding claim, in which the undulating surface comprises two upstanding arcuate ribs at the bottom of the passageway.

5. An instrument according to claim 4, in which the 25 ribs are equispaced either side of the centre of the passageway, with a depression between them and depressions at the outside of each rib.

6. An instrument according to claim 4 or 5, in which a cutout is provided in the means defining the passageway to 30 accommodate the trailing haptic of a lens.

7. An instrument according to claim 6, in which the

cutout is an extension of the passageway at one side of the bottom of the passageway adjacent to one of said ribs.

8. An instrument according to claim 1, 2 or 3, in which the undulating surface is provided by a recess in the bottom 5 of the passageway, bounded by a shoulder on each side.

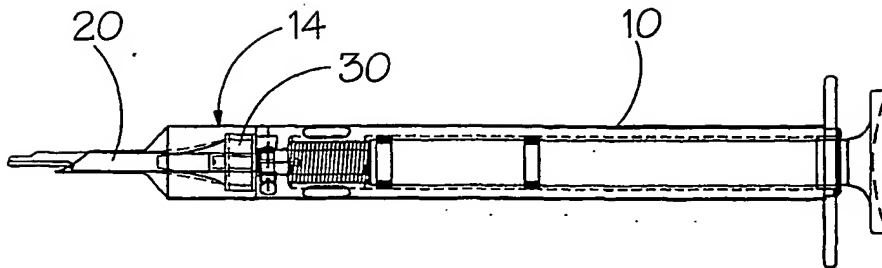
9. An instrument according to claim 8, in which the recess reduces in depth and width in the direction away from the push rod means, to define an upwardly sloping surface on which the lens is to be deposited.

10 10. An instrument according to claim 2 or 3, in which the insert is provided with means to locate a pair of forceps when a lens is deposited in the passageway.

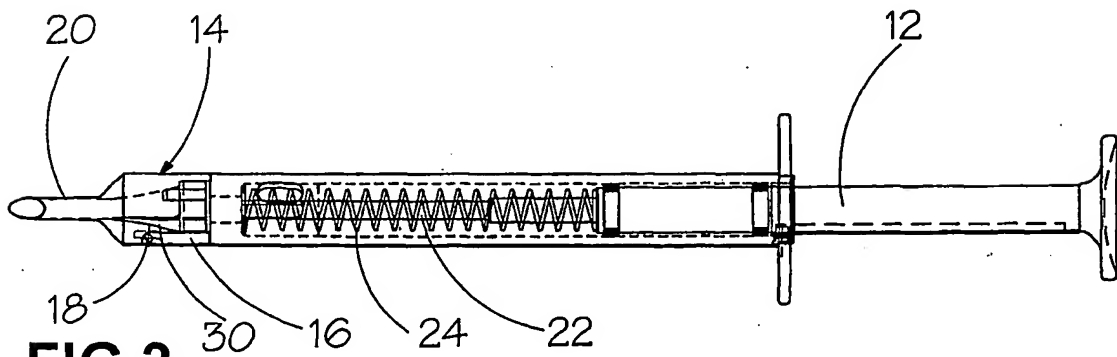
11. An instrument according to any preceding claim, in which the nose portion is pivotable through 90° relative to 15 the body portion.

12. An instrument according to any preceding claim, in which the lateral sides of the passageway are recessed to accommodate a lens of 6,mm diameter.

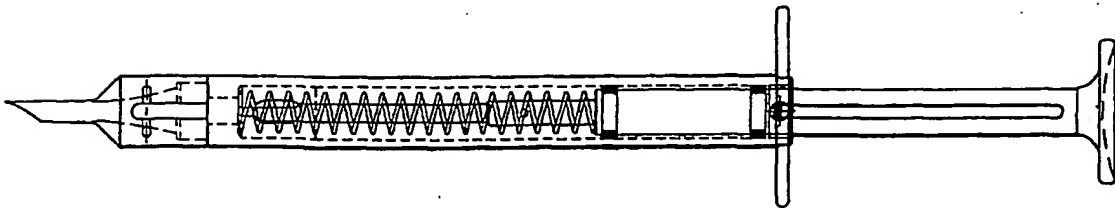
1/5



**FIG.1.**



**FIG.2.**



**FIG.3.**

2/5

FIG.6.

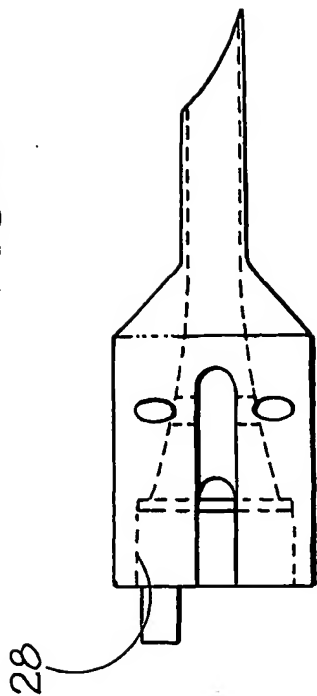


FIG.5.

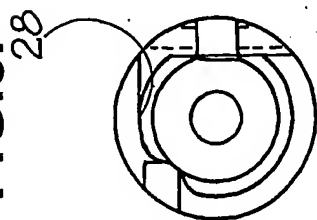


FIG.8.

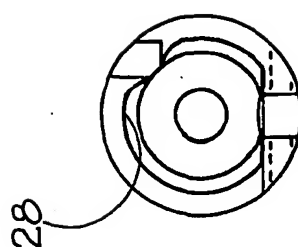


FIG.4.

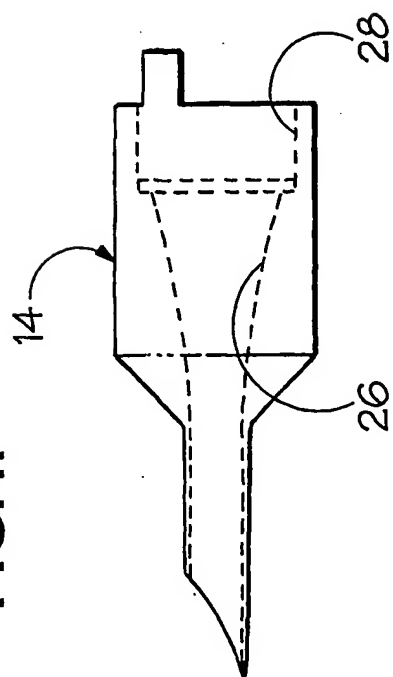
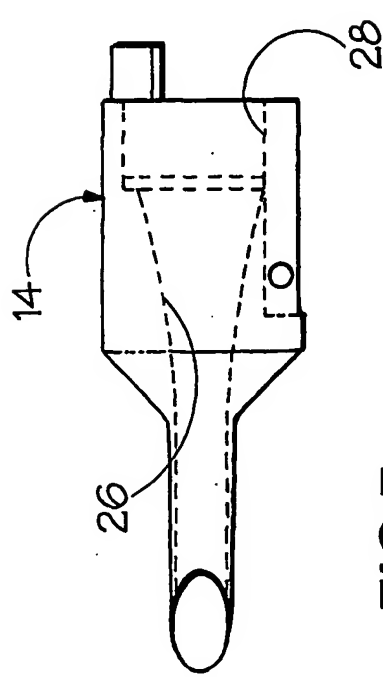


FIG.7.



3/5

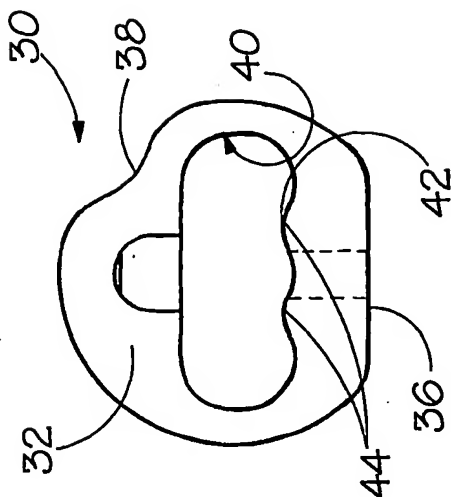


FIG.10.

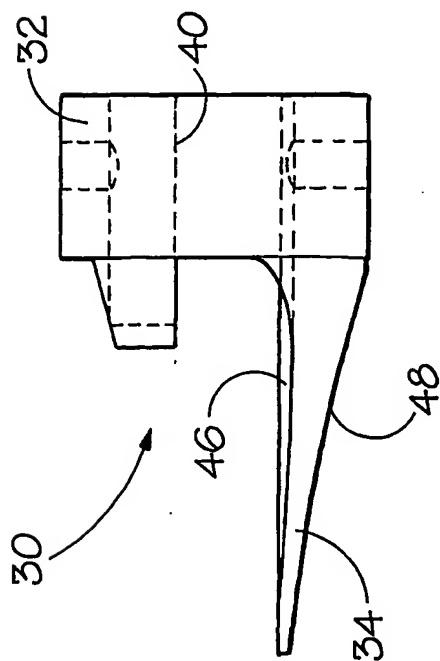
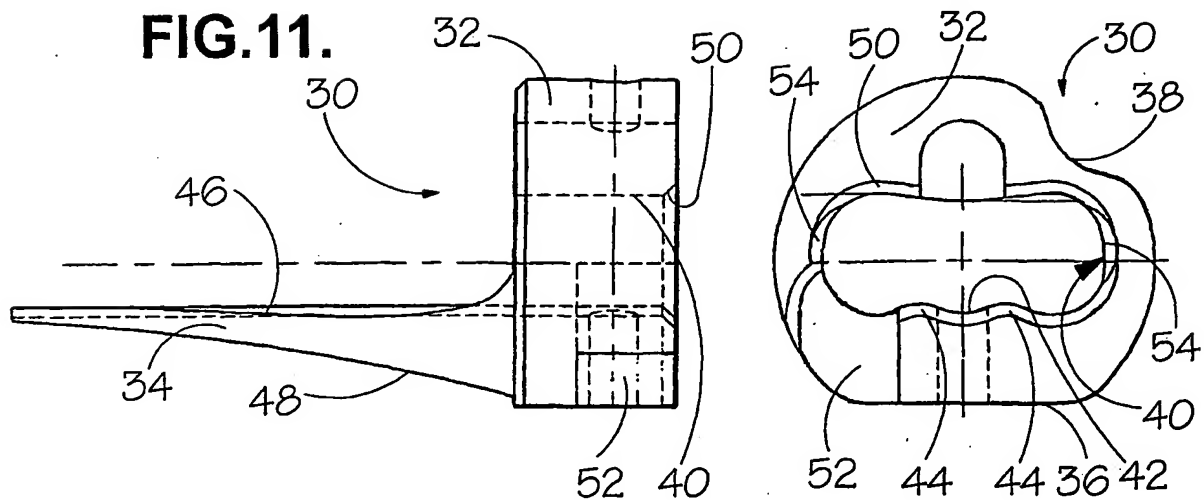


FIG.9.

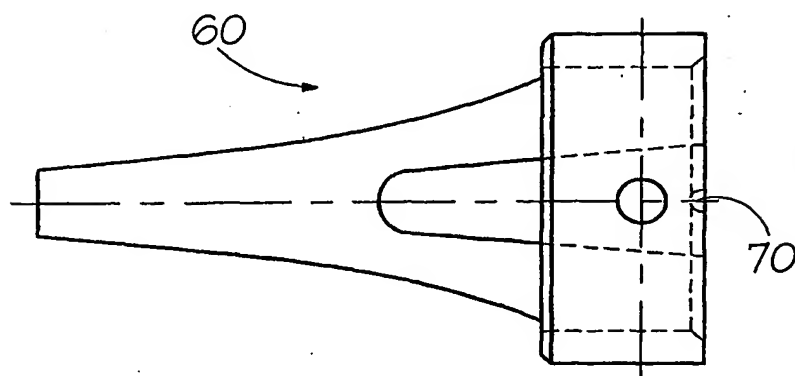
4/5

**FIG.12.**

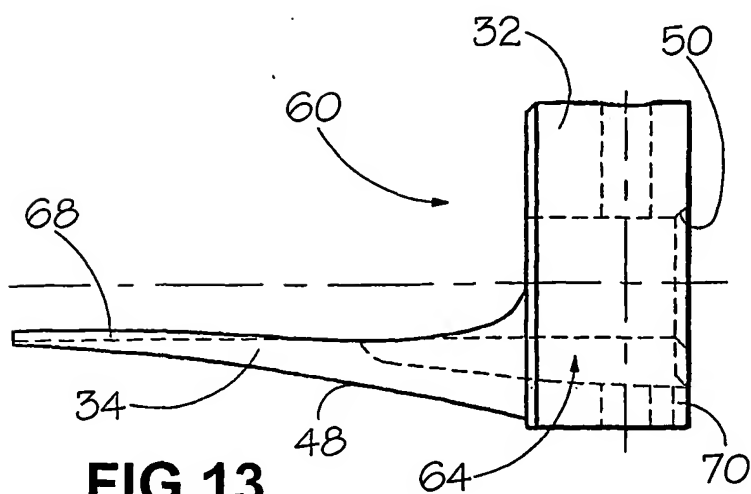
**FIG.11.**



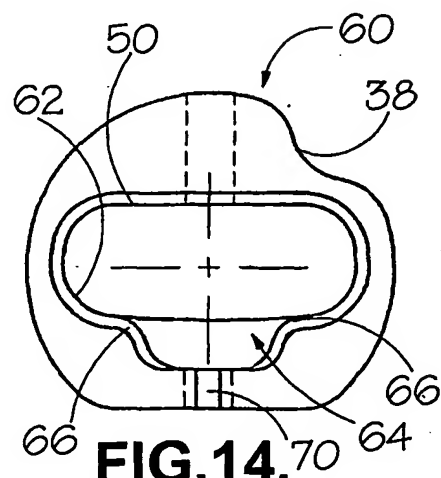
**FIG.15.**



**FIG.13.**



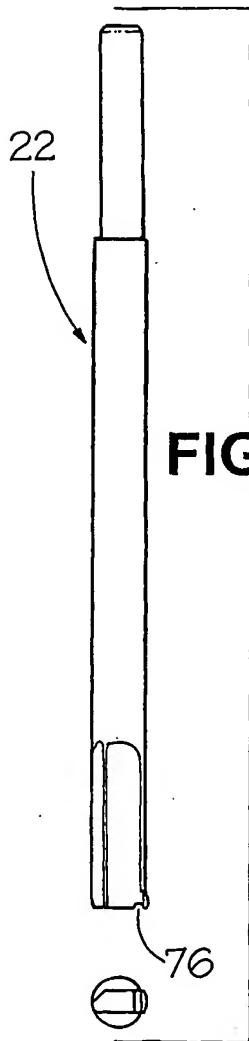
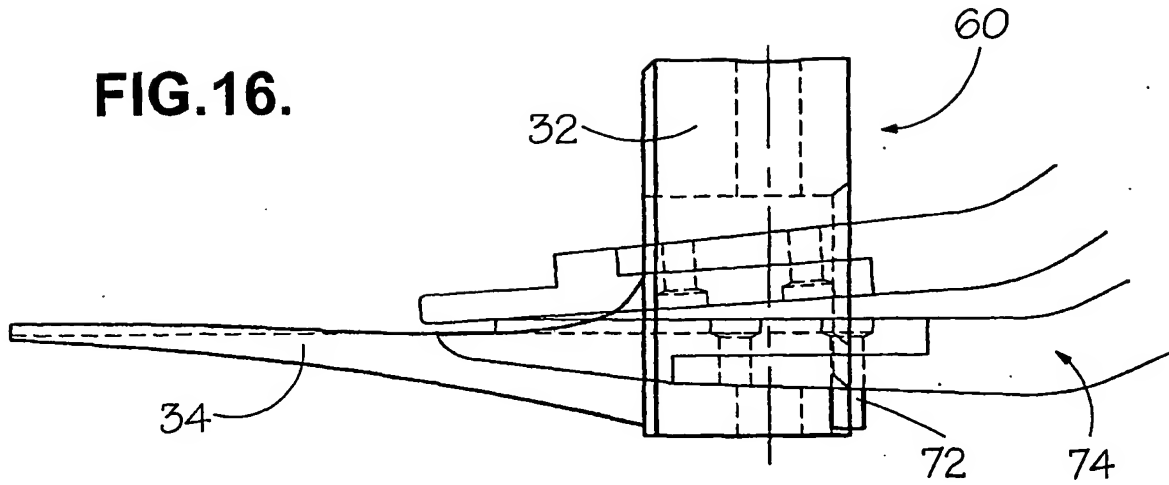
**FIG.14.**



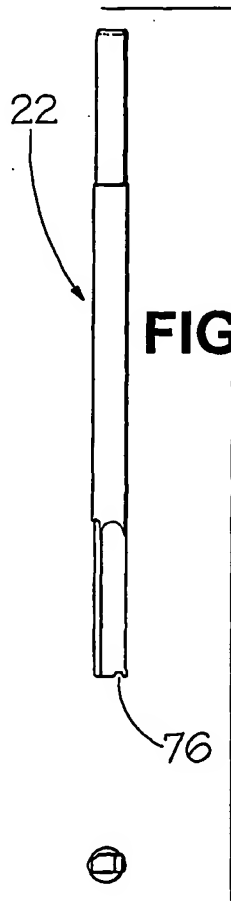


5/5

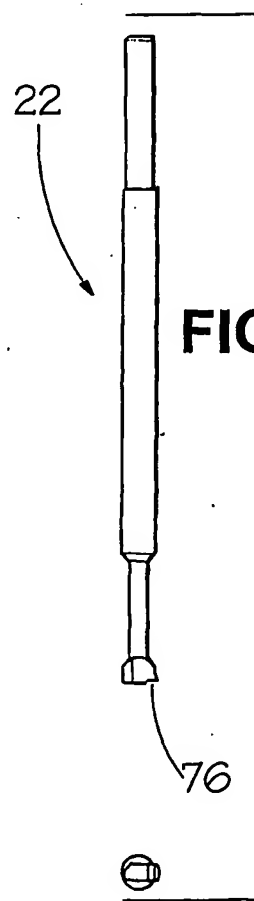
**FIG.16.**



**FIG.17.**



**FIG.18.**



**FIG.19.**

## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 01/02101

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 A61F2/16

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 620 450 A (EAGLES DANIEL C ET AL) 15 April 1997 (1997-04-15) column 6, line 49 - line 64 column 8, line 13 - line 64 column 10, line 35 - column 11, line 22; figures 1-21 ---	1-6,8,10
X	WO 99 37247 A (DUCKWORTH & KENT LTD ; WALDOCK TERENCE ARNOLD (GB)) 29 July 1999 (1999-07-29) page 2, line 20 - page 3, line 27 page 7, line 18 - page 8, line 31 page 14, line 21 - page 17, line 28; figures 1A, 1B, 2, 12-19, 24-30, 32-38, 49-53 --- -/--	1-3, 10, 11

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*G\* document member of the same patent family

Date of the actual completion of the international search

2 August 2001

Date of mailing of the international search report

13/08/2001

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Arjona Lopez, G

## INTERNATIONAL SEARCH REPORT

national Application No

PCT/GB 01/02101

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 5 474 562 A (ORCHOWSKI MICHAEL W ET AL) 12 December 1995 (1995-12-12) column 5, line 3 -column 7, line 9; figures 1-6,14-21 ----	1,10 2,6,10
X Y A	US 5 928 245 A (CHAMBERS THOMAS J ET AL) 27 July 1999 (1999-07-27) column 6, line 25 -column 9, line 22 figures 1-17 ----	1-3,10 4-7 9
X Y	US 5 275 604 A (RHEINISH ROBERT S ET AL) 4 January 1994 (1994-01-04) column 4, line 32 -column 6, line 33; figures 1-6 ----	1,10,12 4-7
X A	WO 99 21513 A (BLAKE LARRY ;CURRIE GENE (US); TEKIA INC (US)) 6 May 1999 (1999-05-06) page 22, line 9 -page 23, line 2; figures 1,1A,1B,4A-4F -----	1 12

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

.../GB 01/02101

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5620450 A	15-04-1997	US 5499987 A	19-03-1996
		US 5941886 A	24-08-1999
		US 5860984 A	19-01-1999
		US 5928245 A	27-07-1999
		US 6056757 A	02-05-2000
		AU 4749496 A	24-07-1996
		CA 2208997 A	11-07-1996
		CN 1172421 A	04-02-1998
		EP 0804131 A	05-11-1997
		JP 10511876 T	17-11-1998
		NZ 301954 A	28-10-1999
		WO 9620662 A	11-07-1996
		US 6162229 A	19-12-2000
		US 6174315 B	16-01-2001
		US 5616148 A	01-04-1997
		US 5772666 A	30-06-1998
		AU 714145 B	23-12-1999
		AU 4501796 A	17-06-1996
		AU 4878799 A	11-11-1999
		CA 2181472 A	30-05-1996
		CN 1143313 A	19-02-1997
		EP 0743840 A	27-11-1996
		JP 9508053 T	19-08-1997
		NZ 300317 A	26-06-1998
		NZ 329985 A	28-10-1999
		US 5902307 A	11-05-1999
		WO 9615743 A	30-05-1996
		US 5807400 A	15-09-1998
		US 5728102 A	17-03-1998
		AU 1846395 A	04-09-1995
		AU 718363 B	13-04-2000
		AU 2125399 A	20-05-1999
		CA 2183462 A	24-08-1995
		CN 1145580 A	19-03-1997
		EP 0901343 A	17-03-1999
		JP 9509086 T	16-09-1997
		NZ 281501 A	24-09-1998
		US 6048348 A	11-04-2000
		WO 9522287 A	24-08-1995
		US 6059791 A	09-05-2000
		EP 0746237 A	11-12-1996
		NZ 282170 A	26-06-1998
		US 6241737 B	05-06-2001
		US 6143000 A	07-11-2000
		AU 692425 B	11-06-1998
		AU 5349594 A	26-04-1994
		AU 717897 B	06-04-2000
		AU 6197498 A	13-08-1998
		CA 2144741 C	08-04-1997
		EP 0723429 A	31-07-1996
WO 9937247 A	29-07-1999	AU 731944 B	05-04-2001
		AU 1776199 A	19-07-1999
		AU 2177599 A	09-08-1999
		EP 0966238 A	29-12-1999
		EP 0971648 A	19-01-2000
		WO 9933411 A	08-07-1999
		GB 2335148 A	15-09-1999

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

/GB 01/02101

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9937247 A		GB 2336785 A	03-11-1999
		US 6203549 B	20-03-2001
US 5474562 A	12-12-1995	US 5653715 A	05-08-1997
		AU 6363394 A	26-09-1994
		EP 0688183 A	27-12-1995
		JP 8507457 T	13-08-1996
		WO 9420027 A	15-09-1994
		US 6214015 B	10-04-2001
		US 5860986 A	19-01-1999
US 5928245 A	27-07-1999	US 5772666 A	30-06-1998
		US 5616148 A	01-04-1997
		US 5620450 A	15-04-1997
		US 5807400 A	15-09-1998
		US 5941886 A	24-08-1999
		US 5860984 A	19-01-1999
		US 6056757 A	02-05-2000
		AU 7476996 A	15-05-1997
		CA 2234002 A	01-05-1997
		CN 1200659 A	02-12-1998
		EP 0858304 A	19-08-1998
		JP 11514278 T	07-12-1999
		WO 9715253 A	01-05-1997
		US 6162229 A	19-12-2000
		US 6174315 B	16-01-2001
		AU 712574 B	11-11-1999
		AU 5933996 A	11-12-1996
		CA 2220370 A	28-11-1996
		CN 1185098 A	17-06-1998
		EP 0830083 A	25-03-1998
		JP 11510711 T	21-09-1999
		US 6048348 A	11-04-2000
		WO 9637152 A	28-11-1996
		US 6059791 A	09-05-2000
		AU 720114 B	25-05-2000
		AU 5309896 A	02-10-1996
		CA 2215182 A	19-09-1996
		CN 1185100 A	17-06-1998
		EP 0957848 A	24-11-1999
		JP 11506357 T	08-06-1999
		WO 9628122 A	19-09-1996
		US 6022358 A	08-02-2000
		US 5800442 A	01-09-1998
		AU 5359796 A	02-10-1996
		CA 2214638 A	19-09-1996
		EP 0813400 A	29-12-1997
		JP 11506356 T	08-06-1999
		WO 9628121 A	19-09-1996
		AU 4749496 A	24-07-1996
		CA 2208997 A	11-07-1996
		CN 1172421 A	04-02-1998
		EP 0804131 A	05-11-1997
		JP 10511876 T	17-11-1998
		NZ 301954 A	28-10-1999
		WO 9620662 A	11-07-1996
		AU 714145 B	23-12-1999
		AU 4501796 A	17-06-1996

# INTERNATIONAL SEARCH REPORT

Information on patent family members

ional Application No

GB 01/02101

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5928245 A		AU 4878799 A CA 2181472 A CN 1143313 A	11-11-1999 30-05-1996 19-02-1997
US 5275604 A	04-01-1994	NONE	
WO 9921513 A	06-05-1999	AU 7361898 A AU 8283298 A WO 9921514 A	17-05-1999 17-05-1999 06-05-1999